

RADON CONCENTRATION TREND IN A TOURIST CAVE (GROTTA GIGANTE, NORTH-EAST ITALY)

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Elevated concentrations of Rn-222 have been recorded in many limestone caves throughout the world. In some cases it represents an impact and risk for those who work in caves and it is necessary to estimate the safety level for workers. In any case it is interesting to study the spatial distribution and time variation of radon concentration inside caves.

A study was carried out in the Grotta Gigante, a very large tourist cave near Trieste (North-East Italy), for over one year. After a first study which excluded risks for workers and visitors, a more detailed study was performed to analyze the distribution of radon concentrations in the different parts of the cave and observe the trend over the year. Different kinds of measurements were performed: short-term measurements by E-Perm electrets to study radon concentration distribution in the cave and long-term measurements by active RAD-7 instruments to study the radon concentration trend over the year and any correlation of radon concentration with the internal and external temperature of the cave and other parameters. Radon concentrations over 20,000 Bq.m⁻³ were measured in summer in a non-tourist part of the cave. In the same site radon concentrations below 100 Bq.m⁻³ were recorded during colder seasons.

Radon monitoring is a worldwide problem. In Italy radon monitoring must be carried out by law in schools and public and private offices, as radon may represent a danger for public health.

In Italy the law provides that the rate must not exceed 400 becquerels pro cubic meter in workplaces, and if radon exceeds allowed levels workers should undergo particular medical check-ups.

As the Grotta Gigante is a workplace, we began monitoring radon and the Agenzia

regionale per la protezione dell' ambiente (Regional agency for the protection of the environment), in compliance with the Italian law, drew up the final technical report, which includes the results of the measurements taken on the tourist pathway. Radon levels do not exceed the limits imposed by the Italian law, that is to say 400 becquerels.

At the same time we decided to continue the survey in collaboration with ARPA (Regional agency for the protection of the environment), Grotta Gigante and the University of Trieste.

The survey gave surprising results: a high peak of 20,000 becquerels was detected, and the day after the value dropped to zero.

It is to be noticed that the value was detected in a closed gallery, very close to the surface, where tourists and staff never go.

Therefore, the cause of these anomalous values is currently under investigation, as well as a correlation with the data of the official weather station of the Regional agency for the protection of the environment outside the cave (the outside data storage dates back to 40 years ago).

Data, both in the outside and the underground station, are collected and recorded every 15 minutes (temperature, barometric pressure). So we want to investigate whether there is a correlation between the data of the climatological and meteorological station and the values of radon, considering that the best parameters for the monitoring of radon are the meteorological ones.

Besides, this high value does not imply special medical examinations for the staff since it has been detected from time to time and the normal average is below 400 becquerels, and for the same reason there is no problem for visitors.